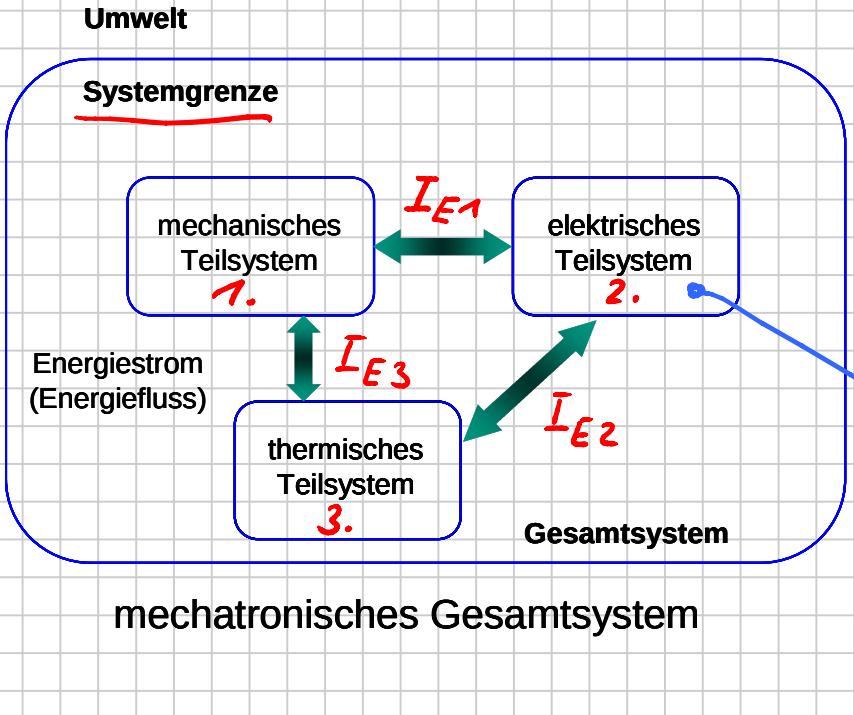
1. Mechatronische Netzwerke

Prof. Grabow

Energiestromprinzip



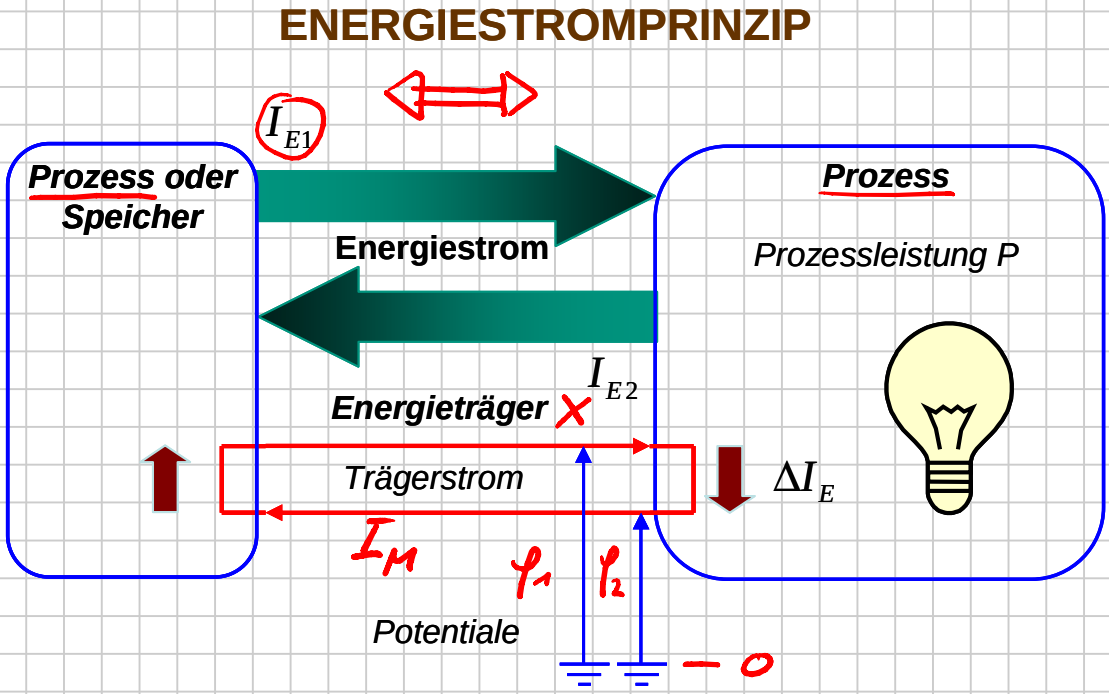
mechatronisches Gesamtsystem

Energiestrom (Energiefluss)

$$I_E := \frac{dE}{dt} = \dot{E}$$

$$[I_E] = \frac{J}{s} = W$$

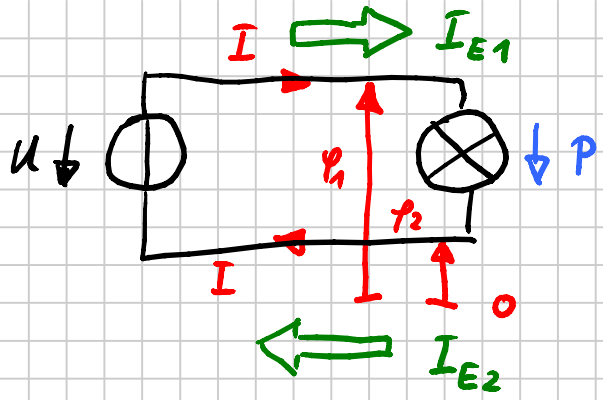
Energiestrom ≠ Leistung



Notwendig:

- Energie (z.B. elektrische Energie) $\rightsquigarrow I_E = \frac{dE}{dt}$
- Energieträger X
- Trägerstrom I_M (Massenstrom)
- Potentiale φ

Bsp. 1



$I_E = \dot{E} := I_M \cdot \varphi$

$I_{E1} = I \cdot \varphi_1$ $\quad I = 1A, \varphi_1 = 220V$

$I_{E2} = I \cdot \varphi_1$ $\quad \varphi_2 = 0V$

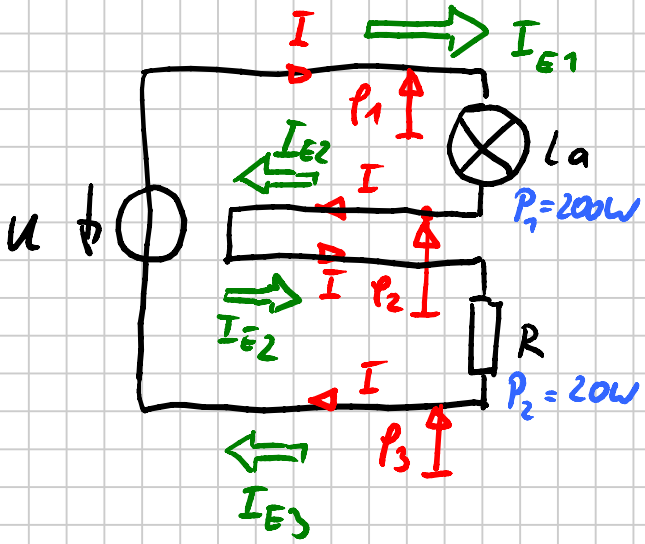
$I_{E1} = 1A \cdot 220V = 220W$

$I_{E2} = 1A \cdot 0V = 0W$

$P = 220W$

$P := \Delta I_E = I_{E1} - I_{E2}$

Bsp. 2



$I_M = I = 1A$ $\quad I_{E1} = I\varphi_1 = 220W$

$\varphi_1 = 220V$ $\quad I_{E2} = I\varphi_2 = 20W$

$\varphi_2 = 20V$ $\quad I_{E3} = I\varphi_3 = 0W$

$\varphi_3 = 0V$

$P_1 = \Delta I_E = I_{E1} - I_{E2} = 200W$

$P_2 = \Delta I_E = I_{E2} - I_{E3} = 20W$

benötigte Grundgrößen

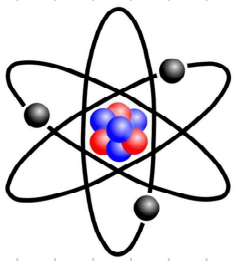
0) E, I_E, P

A.) Energiestrom X (Primärgröße, mengenartige Größe)

B.) Potential φ

C.) Trägerstrom I_M (Mengenstrom)

Eigenschaften von Materie



- mechanische Eigenschaften (Mechanik)
- elektrische Eigenschaften } (Elektrochemie)
- magnetische Eigenschaften }
- thermische Eigenschaften (Thermodynamik)
- chemische Eigenschaften (Chemie)